



DETAILED DESCRIPTION OF AN EXEMPLARY EMBODIMENT

Figure 1 is a diagram showing an exploded view of the power chip resistor of the present invention. In Figure 1, two chip resistors 10 are shown. Each power chip may be of an internationally standard size although the present invention contemplates custom sizes as well. Each chip resistor is a thick film power chip resistor. The thick film power chip resistor has a resistive element 12. This resistive element is a thick film resistive element and preferably is ruthenium oxide. The thick film resistor preferably has an alumina substrate 11. The present invention is not limited to the particular type of film resistor and the present invention contemplates that other types of material may be used for the resistive element and for the substrate.

In the Claims

Please cancel claim 19.

Kindly amend claims 1, 2, 3, 7, 8, 9, 10, 11, 12, 16, 17, 18, 24, and 25 as follows:

1. (Amended)

A power chip resistor comprising:
a first and second film resistor each having (a) a substrate with a top surface, a bottom surface, a first end surface, an opposing end surface, a first side surface and an opposing side surface, (b) a film resistive element on the top surface of each substrate, (c) an end cap on the first end surface and electrically connected to the film resistive element, and (d) a second end cap on the opposing end surface and electrically connected to the film resistive element;
the second film resistor of approximately the same physical size as the first film resistor, the second film resistor of approximately the same orientation as the first film resistor;
an encapsulant between the top surface of the first film resistor and the bottom surface of the second film resistor, separating the first film resistor and the second film resistor when the resistors are stacked;
a first nickel barrier connecting the end cap on the first end surface of the first film resistor and the first end surface of the second film resistor;

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a second nickel barrier connecting the second end cap on the second end surface of the first film resistor and the second end cap on the second end surface of the second film resistor.

2. (Amended)

The power chip resistor of claim 2 wherein the film resistive elements are thick film resistive elements.

3. (Amended)

Sb
D1

The power chip resistor of claim 1 wherein the film resistive elements comprise ruthenium oxide.

7. (Amended)

Sb
G27

The power chip resistor of claim 1 further comprising:

a third film resistor having (a) a substrate with a top surface, a bottom surface, a first end surface, an opposing end surface, a first side surface and an opposing side surface, (b) a film resistive element on the top surface of the substrate, (c) an end cap on the first end surface electrically connected to the film resistive element, and (d) a second end cap on the opposing end surface and electrically connected to the film resistive element; a second encapsulant between the top surface of the substrate of the second film resistor and the bottom surface of the substrate of the third film resistor, separating the second film resistor and the third film resistor when the resistors are stacked, the first nickel barrier electrically connected to the end cap of the first end surface of the third film resistor, the second nickel barrier electrically connected to the second end cap on the second end surface of the third film resistor.

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8. (Amended)

Sb
G37

The power chip resistor of claim 7 further comprising:

a fourth film resistor having (a) a substrate with a top surface, a bottom surface, a first end surface, an opposing end surface, a first side surface and an opposing side surface, (b) a film resistive element on the top surface of the substrate, (c) an end cap on the first end surface electrically connected to the film resistive element, and (d) a second end cap on

13.3 cont.
the opposing end surface and electrically connected to the film resistive element; a third encapsulant between the top surface of the substrate of the third film resistor and the bottom surface of the substrate of the fourth film resistor, separating the third film resistor and the fourth film resistor when the resistors are stacked, the first nickel barrier electrically connected to the end cap of the first end surface of the fourth film resistor, the second nickel barrier electrically connected to the second end cap on the second end surface of the fourth film resistor.

9. (Amended)

13.3 cont.
A power chip resistor comprising:

- a first and second film resistor each having (a) a substrate with a top surface, a bottom surface, a first end surface, an opposing end surface, a first side surface and an opposing side surface, (b) a film resistive element on the top surface of each substrate, (c) an end cap on the first end surface of each surface electrically connected to the film resistive element, and (d) a second end cap on the opposing end surface of each substrate and electrically connected to the film resistive element; a glass encapsulant between the top surface of the substrate of the first film resistor and the bottom surface of the substrate of the second film resistor for separating the first film resistor and the second film resistor when the resistors are stacked;
- a first metal barrier covering the end caps on the first end surface of the substrate of the first and second film resistors;
- a second metal barrier covering the second end caps on the opposing end surface of the substrate of the first and second film resistors.

10. (Amended)

13.3 cont.
The power chip resistor of 9 wherein the first and second metal barriers comprise a nickel alloy.

11. (Amended)

13.3 cont.
The power chip resistor of 10 wherein the first and second metal barriers comprise nickel.

12. (Amended)

The power chip resistor of claim 9 wherein the film resistive elements comprise ruthenium oxide.

16. (Amended)

The power chip resistor of claim 9 further comprising:

- § 45
(47)
- a third film resistor having (a) a substrate with a top surface, a bottom surface, a first end surface, an opposing end surface, a first side surface and an opposing side surface, (b) a film resistive element on the top surface of the substrate, (c) an end cap on the first end surface electrically connected to the film resistive element, and (d) a second end cap on the opposing end surface and electrically connected to the film resistive element;
 - a second encapsulant between the top surface of the substrate of the second film resistor and the bottom surface of the substrate of the third film resistor, separating the second film resistor and the third film resistor when the resistors are stacked, the first nickel barrier electrically connected to the end cap of the first end surface of the third film resistor, the second nickel barrier electrically connected to the second end cap on the second end surface of the third film resistor.

17. (Amended)

The power chip resistor of claim 16 further comprising:

- a fourth film resistor having (a) a substrate with a top surface, a bottom surface, a first end surface, an opposing end surface, a first side surface and an opposing side surface, (b) a film resistive element on the top surface of the substrate, (c) an end cap on the first end surface electrically connected to the film resistive element, and (d) a second end cap on the opposing end surface and electrically connected to the film resistive element; a third encapsulant between the top surface of the substrate of the third film resistor and the bottom surface of the substrate of the fourth film resistor, separating the third film resistor and the fourth film resistor when the resistors are stacked, the first nickel barrier electrically connected to the end cap of the first end surface of the fourth film resistor, the second nickel barrier electrically connected to the second end cap on the second end surface of the fourth film resistor.

18. (Amended)

A stacked chip resistor comprising:

- a first chip resistor and a second chip resistor, each chip resistor having a substrate with a thick film resistive element attached to the substrate, a first end cap and a second end cap, each end cap being an electrical terminal connected to the thick film resistive element, the first chip resistor and the second chip resistor capable of being aligned and stacked;
- a layer of glass for separating the chip resistors, the layer of glass placed between the first chip resistor and the second chip resistor;
- a first nickel barrier, the nickel barrier electrically connecting the first end cap of the first chip resistor and the first end cap of the second chip resistor;
- a second nickel barrier, the nickel barrier electrically connecting the second end cap of the first chip resistor and the second end cap of the second chip resistor.

24. (Amended)

The stacked chip resistor of claim 18 further comprising:

- a third chip resistor, the third chip resistor having a substrate with a thick film resistive element attached to the substrate, a first end cap and a second end cap, each end cap being an electrical terminal connected to the thick film resistive element, the third chip resistor capable of being aligned and stacked with the first chip resistor and the second chip resistor;
- a second layer of glass for separating the second chip resistor and the third chip resistor, the second layer of glass placed between the second chip resistor and the third chip resistor, the first nickel barrier electrically connected to the first end cap of the third chip resistor, the second nickel barrier electrically connected to the second end cap of the third chip resistor.

25. (Amended)

The stacked chip resistor of claim 24 further comprising:

- a fourth chip resistor, the fourth chip resistor having a substrate with a thick film resistive element attached to the substrate, a first end cap and a second end cap, each end cap being

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an electrical terminal connected to the thick film resistive element, the fourth chip resistor capable of being aligned and stacked with the first chip resistor, the second chip resistor, and the third chip resistor;

a third layer of glass for separating the third chip resistor and the fourth chip resistor, the third layer of glass placed between the third chip resistor and the fourth chip resistor, the first nickel barrier electrically connecting the first end cap of the fourth chip resistor with the first end cap of the first chip resistor and the first end cap of the second chip resistor and the first end cap of the third chip resistor, the second nickel barrier electrically connected to the second end cap of the fourth chip resistor.
